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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/049,830	02/19/2002	Kenji Tsukada	Q67368	6300
7590	03/10/2005		EXAMINER	
Sughrue Mion Zinn Macpeak & Seas 2100 Pennsylvania Avenue NW Washington, DC 20037-3202			DO, AN H	
			ART UNIT	PAPER NUMBER
			2853	

DATE MAILED: 03/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/049,830

Applicant(s)

TSUKADA ET AL.

Examiner

An H. Do

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) 37, 40 and 41 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-25, 28-36, 38, 39 and 44 is/are allowed.
- 6) ☒ Claim(s) 26, 42 and 43 is/are rejected.
- 7) ☒ Claim(s) 27 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date (see Off. Action).
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

The RCE filed on 14 February 2005 has been acknowledged.

#### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 14 February 2005 has been entered.

#### ***Information Disclosure Statement***

2. The information disclosure statements (IDS) submitted on 05 April 2004, 26 August 2004, 19 November 2004, 24 November 2004, 15 December 2004 and 01 February 2005 were filed and are being considered by the examiner.

#### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 26, 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cook (US 6,155,664) in view of Anderson et al (US 6,044,694).

Cook discloses a printing apparatus and a method of controlling an ink jet recording apparatus on which a liquid container is able to be detachably mounted,

(Figure 1, element 2), said liquid container having a container body containing liquid ink supplied to a recording head discharging an ink droplet from a nozzle opening (Figure 1, element 24), a liquid supplying opening for supplying said liquid outside of said container body, Figure 1, (as evidenced by supply line 7).

Cook discloses the claimed invention except for reciting a controller detecting an oscillation characteristic value of at least a first piezoelectric device coupled to the liquid container and a second piezoelectric device coupled to the liquid container; determining an amount of liquid consumed from the liquid container based on a first oscillation characteristic value of the first piezoelectric device and a second oscillation characteristic value of the second piezoelectric device or that the piezoelectric device is positioned just below an initial liquid level of said liquid.

Anderson et al teach plural piezoelectric devices for detecting said liquid within said container body (Figure 2, elements 50, 52, and 54), comprising the steps of detecting a characteristic value of said piezoelectric device by a detection section provided inside or outside of said ink jet recording apparatus (Figure 2 shows bender portion of the piezoelectric detector inside the container), Column 2, lines 28- 52 (characteristic of the piezoelectric detector), judging whether or not said characteristic value satisfies a predetermined condition by a judging section provided inside or outside of said ink jet recording apparatus (Abstract, lines 8 – 11) . Anderson et al also teach a method of controlling an ink jet recording apparatus, wherein said characteristic value is an element characteristic value of a piezoelectric element of said piezoelectric device

(Column 2, lines 34 - 42 cite measuring frequency, impedance, rest oscillating properties, and Q characteristics of the piezoelectric detection device).

Anderson et al further teach wherein said detection section detects oscillation characteristic values of said at least two piezoelectric devices in said detecting step, and wherein said judging section judges a consumption state of said liquid within said liquid container based on a relative condition of mutual oscillation characteristic values of said at least two piezoelectric devices in said judging step (Column 4, lines 4 – 15); said additional piezoelectric device is positioned nearby a bottom surface of said container body (Figure 2, element 50), clearly seen; said additional piezoelectric device is positioned nearby said piezoelectric device, an initial liquid level when said liquid within said container body is not consumed being located between said piezoelectric device and said additional piezoelectric device (Figure 2, element 32 (liquid), elements 50 and 54 (piezoelectric detectors)); and an oscillating section of the piezoelectric device is positioned just below an initial liquid level of said liquid (Figure 2, element 54).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the piezoelectric detector of Anderson et al in the recording apparatus (ink jet printer of Cook) in order to detect ink levels, viscosity and density of the ink, and shutting down printing operations to prevent possible damage to the printhead.

***Response to Arguments***

5. Applicant's arguments filed 14 February 2005 have been fully considered but they are not persuasive. Applicant argued that Cook in view of Anderson fail to disclose a piezoelectric device or detecting ink within the container body is positioned slightly below an initial ink level which corresponds to a level of the ink in the container body before bringing the cartridge into use. However, this argument is not persuasive because Anderson does show in Figure 2 that element 54 is clearly positioned slightly below the initial or full level of ink as seen in ink tanks 34 or 36. Applicant further argued that neither Cook nor Anderson discloses a vibrating region that extends from a liquid level to a bottom surface of the liquid container. Again, this argument is not persuasive for the reason that elements 50, 52 and 54 together generate a vibration region vertically that extends from a liquid level to a bottom surface of the liquid container.

***Allowable Subject Matter***

6. Claims 1-25, 28-36, 38, 39 and 44 are allowed.

The following is an examiner's statement of reasons for allowance:

The primary reason for the allowance of claims 1, 3-7 and 28 is the inclusion of the method step of controlling said ink jet recording apparatus so that said ink jet recording apparatus is set in an operable state or in a non-operable state based on a result of said judging step, wherein said piezoelectric device has a vibrating portion which comes into contact with said liquid in said container body via a cavity, said cavity defining an area of said vibrating portion, and wherein said characteristic value is

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detected based on a signal output from said piezoelectric device, said signal indicating a residual oscillating state of said vibrating portion of said piezoelectric device, said characteristic value changing based on phenomenon that said residual oscillating state changes corresponding to a liquid consuming state. It is this step found in each of the claims, as it is claimed in the combination of, that has not been found, taught, or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claim 2 is the inclusion of the method step of controlling said ink jet recording apparatus so that said ink jet recording apparatus is set in an operable state or in a non-operable state based on a result of said judging step, wherein said detecting step is executed at the time that said liquid container is mounted on said ink jet recording apparatus. It is this step found in each of the claims, as it is claimed in the combination of, that has not been found, taught, or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claims 8, 9, 16-19, 24, 29 and 30 is the inclusion of the limitation of an apparatus for controlling an ink jet recording apparatus on which a liquid container is able to be detachably mounted, that includes a controlling section for controlling said ink jet recording apparatus so that said ink jet recording apparatus is set in an operable state or in a non-operable state based on a result obtained by said judging section, wherein said piezoelectric device has a vibrating portion which comes into contact with said liquid in said container body via a cavity, said

cavity defining an area of said vibrating portion; and wherein said characteristic value is detected based on a signal output from said piezoelectric device, said signal indicating a residual oscillating state of said vibrating portion of said piezoelectric device, said characteristic value changing based on phenomenon that said residual oscillating state changes corresponding to a liquid consuming state. It is this limitation found in each of the claims, as it is claimed in the combination of, that has not been found, taught, or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claims 10-15 and 44 is the inclusion of the limitation of a liquid container that includes a piezoelectric having a vibrating portion which comes into contact with said liquid in said container body via a cavity, said cavity defining an area of said vibrating portion; wherein a characteristic value is detected based on a signal output from said piezoelectric device, said signal indicating a residual oscillating state of said vibrating portion of said piezoelectric device, said characteristic value changing based on phenomenon that said residual oscillating state changes corresponding to a liquid consuming state. It is this limitation found in each of the claims, as it is claimed in the combination of, that has not been found, taught, or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claims 20 and 21 is the inclusion of the method step of judging a consumption state of said liquid within said liquid container based on a relative condition of mutual oscillation characteristic values of said at least



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two piezoelectric devices by a judging section, said judging section being provided inside or outside of said inkjet recording apparatus. It is this step found in each of the claims, as it is claimed in the combination of, that has not been found, taught, or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claims 22 and 23 is the inclusion of the limitation of an ink jet recording apparatus on which a liquid container is able to be detachably mounted, that includes a controller for controlling an operation state of said ink jet recording apparatus, said controller including a judging section for judging a consumption state of said liquid within said liquid container based on a relative condition of mutual oscillation characteristic values of said at least two piezoelectric devices. It is this limitation found in each of the claims, as it is claimed, in the combination of, that has not been found, taught, or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claim 25 is the inclusion of the limitation of an apparatus for controlling an ink jet recording apparatus on which a liquid container is able to be detachably mounted, that includes a controlling section for controlling said ink jet recording apparatus so that said ink jet recording apparatus is set in an operable state or in a non-operable state based on a result obtained by said judging section, wherein a vibrating region of said piezoelectric device extends from an initial liquid level of said liquid, before said liquid is consumed, to a bottom surface of said liquid container. It is this limitation found in each of the claims, as it is claimed in the

combination of, that has not been found, taught, or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claims 31 and 32 is the inclusion of the method step of controlling an ink jet recording apparatus on which a liquid container is able to be detachably mounted, that includes a piezoelectric device having a vibrating portion that contacts liquid in the liquid container via a cavity of the liquid container, wherein the vibrating portion covers an outer opening of the cavity. It is this step found in each of the claims, as it is claimed in the combination of, that has not been found, taught, or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claims 33 and 34 is the inclusion of the method step of controlling an ink jet recording apparatus, on which a liquid container is able to be detachably mounted, that includes a characteristic value detected when the liquid container is being mounted on the ink jet recording apparatus. It is this step found in each of the claims, as it is claimed in the combination of, that has not been found, taught, or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claims 35, 36, 38 and 39 is the inclusion of the limitation of an apparatus for controlling an ink jet recording apparatus on which a liquid container is able to be detachably mounted, that includes a piezoelectric device having a vibrating portion that contacts liquid in the liquid container via a cavity of the liquid container, and the vibrating portion covers an outer opening of the cavity. It is this

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limitation found in each of the claims, as it is claimed in the combination of, that has not been found, taught, or suggested by the prior art of record which makes these claims allowable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

7. Claim 27 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The primary reason for the allowance of claim 27 is the inclusion of the limitation of an ink cartridge that includes a piezoelectric device having a vibrating portion which comes into contact with said ink in said container body via an opening, said opening defining an area of said vibrating portion. It is this limitation found in the claims, as it is claimed in the combination of, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Birkett (US 5,410,518) and Barbehenn et al (US 5,774,136) disclose an ultrasonic transducer for use in measuring liquid level. Froger et al (US 6,164,744) disclose a method and device for monitoring the characteristics of

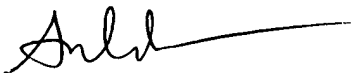
measurement in an ink liquid reservoir. Thornton et al (US 6,089,686) disclose a method of determining the ink levels sensed by ink sensor in the reservoir. Cowger et al (US 5,788,388) disclose an ink cartridge having an ink level sensor in the cartridge housing to detect the amount of ink contained in the cartridge.

***Contact Information***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to An H. Do whose telephone number is 571-272-2143. The examiner can normally be reached on Monday-Friday (Flexible).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on 571-272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



An H. Do  
March 4, 2005